

REMARKS

Applicants respectfully request the entry of the above Amendment. Upon entry of the Amendment, claims 1-8 will be pending in the application, of which claims 1 and 8 are independent. Claim 9 will be cancelled, and claims 1 and 8 will be amended.

Applicant respectfully requests that this Amendment under 37 C.F.R. § 1.116 be entered by the Examiner, placing claims 1-8 in condition for allowance. The proposed amendments of claims 1 and 8 do not raise new issues or necessitate the undertaking of any additional search of the art by the Examiner, since all of the elements and their relationships claimed were either earlier claimed or inherent in the claims as examined. Therefore, this Amendment should allow for immediate action by the Examiner.

Furthermore, Applicant respectfully points out that the final action by the Examiner presented some new arguments as to the application of the art against Applicant's invention. It is respectfully submitted that the entering of the Amendment would allow the Applicant to reply to the final rejections and place the application in condition for allowance.

Finally, The entry of the amendment would place the application in better form for appeal, should the Examiner dispute the patentability of the pending claims.

Background and Description of the Invention

Typical plasma processing apparatuses are designed to keep the apparatus footprint at a minimum and to maintain low costs by connecting multiple processing units to a common transfer chamber. The plasma processing apparatus may include a waveguide associated with each processing unit. Plasma concentrations within each processing unit are affected by the position of the waveguide relative to the unit, and by

any bends in the waveguide. Because the waveguides in a typical system are oriented to maintain a small footprint, for convenience of operation, or to reduce costs, the waveguide for each unit may not be located in the same position with respect to the processing unit, or a wafer in the processing unit. Accordingly, separate wafers processed in separate processing units have different areas plasma concentrations.

The present invention provides a system for treating wafers that provides substantially the same plasma concentrations on the wafers regardless of which processing unit the wafers are treated in, resulting in consistently manufactured wafers. To achieve consistent plasma concentrations between units, the waveguide on each processing unit is oriented in the same direction relative to the wafer, or relative to the path of the wafer as it is loaded in the processing unit.

Rejection Under 35 U.S.C. § 112

The Examiner rejected claims 1-8 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter of the invention. Applicant proposes to amend independent claims 1 and 8 to more clearly define the invention. Amended claims 1 and 8 recite that the transfer direction is fixed for each of the plurality of plasma processing units. Accordingly, although each processing unit may potentially have a different transfer direction, the direction is fixed. Additionally, Applicant proposes to amend claims 1 and 8 to include other language to more clearly define the invention. Claims 2-7 depend from claim 1. Applicant respectfully requests that the Examiner withdraw the rejection.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

Rejection Under 35 U.S.C. § 103

Claim 9

The Examiner rejected claim 9 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 5,976,259 to Yamazaki in view of U.S. Patent No. 5,320,707 to Kanekiyo *et al.* (Kanekiyo). Applicant requests that claim 9 be cancelled without prejudice to or disclaimer of the subject matter therein. Accordingly, this rejection is rendered moot.

Claims 1-8

Wagner in view Sato or Yamazaki, and in further view of Kanekiyo

The Examiner rejected claim 1-8 under 35 U.S.C. § 103 as being unpatentable over U.S. Patent No. 6,177,129 to Wagner *et al.* in view of U.S. Patent No. 6,306,765 to Sato or U.S. Patent No. 5,976,259 to Yamazaki, and in further view of Kanekiyo. Claim 1 relates to a plasma processing apparatus including a plurality of plasma processing units. Each plasma processing unit includes a vacuum processing chamber having a mounting stage for mounting a substrate with a fixed reference point. Each plasma processing unit also includes a wave guide bent at an angle for introducing high frequency waves into the vacuum processing chamber for converting process gas to plasma by high frequency waves and processing the substrate by the plasma. A common transfer chamber is airtightly connected to the plurality of plasma processing units and includes a transfer arm adapted to transfer the substrate to the mounting stage in a transfer direction that is fixed for each of the plurality of plasma processing units. The transfer arm is also adapted such that the reference point of the substrate is always positioned the same with respect to the transfer arm. For each of the plurality of

plasma processing units, the position of the wave guide in relation to the transfer direction of the transfer arm is the same.

Claim 8 relates to a plasma processing method for performing a predetermined process for a substrate by a plasma processing apparatus. The apparatus comprises a plurality of plasma processing units, each having a vacuum processing chamber including a mounting stage for mounting a substrate with a fixed reference point. The plasma processing unit also includes a wave guide bent at an angle for introducing high frequency waves into the vacuum processing chamber for converting process gas to plasma by high frequency waves and processing the substrate by the plasma. A common transfer chamber is airtightly connected to the plurality of plasma processing units and includes a transfer arm. The transfer arm transfers the substrate to the mounting stage in a transfer direction that is fixed for each of the plurality of plasma processing units. For each of the plasma processing units, the position of the wave guide in relation to the transfer direction of the transfer arm is the same. The method includes the steps of transferring the substrate with the reference point to the mounting stages of the plasma processing units from the transfer chamber. The reference of the substrate is positioned the same in each of the plasma processing units with respect to the wave guide. The method also includes the step of performing a plasma process for the substrate while the position of the reference point of the substrate in relation to the wave guide is kept the same for each of the plasma processing units.

The art cited by the Examiner, alone or in combination, does not teach or suggest all the features of independent claims 1 and 8. Wagner teaches vacuum treatment stations for sequential treatment of semiconductor wafers. Several stations

43_a to 43_c are connected to a transport chamber 40 containing a transport robot 42.

See Wagner, column 9, lines 15-19. The workpieces are transported between vacuum stations 43 in batch mode, that is, robot 42 picks up one workpiece batch B_T in one of the vacuum stations and supplies it to one of the others. See Wagner, column 9, lines 26-29; FIG. 4. In another embodiment, a transport chamber 70 includes a transfer robot 72 which can be extended or retracted. See Wagner column 11, lines 26-26 and 51-53; FIG. 6. However, as acknowledged by the Examiner, Wagner fails to teach or suggest any apparatus having all the claimed elements, including, inter alia, a waveguide.

Sato teaches a CVD apparatus 30 having first and second CVD devices 31, 41. See Sato, column 4, lines 66-67. CVD device 31 includes a plasma chamber 32 and a microwave guide 33 connected to the plasma chamber at the upper side. See Sato, column 3, lines 51-54.

Yamazaki teaches a plasma enhanced CVD system having a reaction chamber 1. A resonating space is formed above the reaction chamber as the inside space of a resonance chamber 2. Microwaves are radiated into the resonance space from a microwave oscillator 3 via an isolator 4 through a window made of synthetic quartz. See Yamazaki, column 2, lines 61-column 3, line 3.

A combination of Wagner, Sato, and Yamazaki does not disclose or suggest the claimed invention, including, for example, a bend in a microwave waveguide. The Examiner relies upon Kanekiyo for an asserted teaching that a bend is a standard configuration. See Office Action, page 6. Kanekiyo teaches a processing apparatus 10 having a waveguide 12a, 12b and a magnetron 13 as a microwave oscillating means.

See Kanekiyo, column 10, lines 11-14. The waveguide is bent. See Kanekiyo, FIGs. 3, 11.

However, the combination of references cited by the Examiner still fails to set forth a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference(s) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488 (Fed. Cir. 1991). See MPEP § 2143.

The combination of references applied by the Examiner fails to teach or suggest all the claim limitations. Claims 1 and 8 recite that "for each of said plurality of plasma processing units, the position of said wave guide in relation to said transfer direction of said transfer arm is the same." None of the references teaches or suggests such a configuration. In fact, the combination of the cited references suggests nothing more than is discussed in the background section of the application, as set forth above. Accordingly, the Examiner has not established a *prima facie* case of obviousness. Accordingly, claims 1 and 8 are allowable over this combination of references.

Claims 2-7 depend from and add additional features to independent claim 1. Accordingly, these claims are also allowable for at least the reasons set forth above. Applicant respectfully requests that the Examiner withdraw the rejection and allow these claims.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

**Wagner in view Sato or Yamazaki, and in further view of Kanekiyo,
and further in view of Jeng *et al.* or Maydan *et al.* or Maher *et al.***

The Examiner also rejected claim 1-8 under 35 U.S.C. § 103 as unpatentable over Wagner in view of Sato or Yamazaki, and in further view of Kanekiyo, and further in view of U.S. Publication No. 2002/0084032 to Jeng *et al.* or U.S. Patent No. 5,292,293 to Maydan *et al.* or U.S. Patent No. 6,413,320 to Maher *et al.*

The Examiner relies upon Jeng, Maydan, or Maher for an asserted teaching of identical placement of substrates as they are moved between chambers. However, the Examiner acknowledges that none of these references disclose any apparatus having waveguides. Claims 1 and 8 recite that "for each of said plurality of plasma processing units, the position of said wave guide in relation to said transfer direction of said transfer arm is the same." The combination of references fails to teach or suggest such a feature. Accordingly, none of the art cited, in any combination, renders unpatentable the invention recited in claims 1 and 8, and claims 1 and 8 are patentable over this combination of references.

Claims 2-7 depend from and add additional features to independent claim 1. Accordingly, these claims are also allowable for at least the reasons set forth above. Applicant respectfully requests that the Examiner withdraw the rejection and allow these claims.

Conclusion

Applicant respectfully requests entry of this Amendment. Upon entry of the Amendment, all of the rejections will have been overcome or rendered moot.

Accordingly, the application will be in condition for allowance.

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

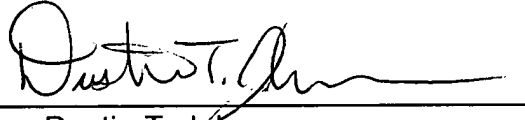
1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

Please grant any extensions of time required to enter this response and charge
any additional required fees to our deposit account 06-0916.

Respectfully submitted,

FINNEGAN, HENDERSON, FARABOW,
GARRETT & DUNNER, L.L.P.

Dated: February 24, 2003

By: 
Dustin T. Johnson
Reg. No. 47,684

FINNEGAN
HENDERSON
FARABOW
GARRETT &
DUNNER LLP

1300 I Street, NW
Washington, DC 20005
202.408.4000
Fax 202.408.4400
www.finnegan.com

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

AMENDMENTS TO THE CLAIMS

Please cancel claim 9.

Please amend claims 1 and 8 as follows:

1. (Twice Amended) A plasma processing apparatus comprising:

a plurality of plasma processing units, each having a vacuum processing chamber including a mounting stage for mounting a substrate with a fixed reference point and a wave guide bent at an angle for introducing high frequency waves into said vacuum processing chamber for converting process gas to plasma by high frequency waves and processing said substrate by said plasma; and

a common transfer chamber airtightly connected to said plurality of plasma processing units and including a transfer arm [for transferring] adapted to transfer said substrate to said mounting stage in a [fixed] transfer direction that is fixed for each of said plurality of plasma processing units, and is adapted such that [in a state that] said reference point of said substrate is always positioned the same with respect to said transfer arm,

wherein for each of said plurality of plasma processing units, the position of said wave guide in relation to said transfer direction of said transfer arm is the same.

8. (Twice Amended) A plasma processing method for performing a predetermined process for a substrate by a plasma processing apparatus comprising a

plurality of plasma processing units, each having a vacuum processing chamber including a mounting stage for mounting a substrate with a fixed reference point and a wave guide bent at an angle for introducing high frequency waves into said vacuum processing chamber for converting process gas to plasma by high frequency waves and processing said substrate by said plasma; and a common transfer chamber airtightly connected to said plurality of plasma processing units and including a transfer arm for transferring said substrate to said mounting stage in a [fixed] transfer direction that is fixed for each of said plurality of plasma processing units, and wherein for each of said plasma processing units, the position of said wave guide in relation to said transfer direction of said transfer arm being the same, comprising the steps of:

transferring said substrate with said reference point to said mounting stages of said plasma processing units from said transfer chamber, said reference point of said substrate being positioned the same in each of said plasma processing units with respect to said wave guide, and

performing a plasma process for said substrate while the position of said reference point of said substrate in relation to said wave guide is kept the same for each of said plasma processing units.